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EXAMINER	
MYERS, JESSICA L	
ART UNIT	PAPER NUMBER
3746	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/553,944	PUFF ET AL.	
	Examiner	Art Unit	
	JESSICA L. MYERS	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/25/08*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17, 28-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 28-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/19/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse pertaining to claims 16-30 in the reply filed on 7/23/2008 is acknowledged. The traversal is on the ground(s) that the present claims were found to have unity of invention by another designated search authority. This is not found persuasive because claims 21-27 are drawn to the use of a mechanical actuator instead of a pneumatic or hydraulic actuator, which means that these claims are drawn to a different special technical feature. Claims 18-20 have also been found to be drawn to a mechanical actuator, as shown in figure 4, instead of a pneumatic or hydraulic actuator, and therefore should have been grouped with group II and not group I. Additionally, as applicant points out, claims 28-30 depend from claim 1 and belong in the previously discussed Group I. Thus claims 1-17 and 28-30 have been examined.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

Second Paragraph, 112 2nd

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 3 recites the limitation "it" in line 1. There is insufficient antecedent basis for this limitation in the claim.

4. Claim 6 recites the limitation "the internal chamber of the piston" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim, since it is unclear whether this is a new internal chamber, or whether it is referred to in line 2 of claim 5

5. Claim 8 recites the limitation "the dead point of the piston" in line 3. There is insufficient antecedent basis for this limitation in the claim.

6. Claim 29 recites the limitation "it" in line 1. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 30 recites the limitation "the return elastic means" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1- 8 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 6,084,320 to Morita et al. (Morita et al.).

In Reference to Claim 1

Morita et al teach a system for adjusting resonant frequencies in a linear compressor (see figures 3 and 4) comprising, in the interior of a shell: a linear motor (linear motor (3)) supplied by an AC electrical current presenting a predetermined

electrical supply frequency (current is supplied to the motor at a given frequency); a cylinder (cylinder (4)) within which is defined a compression chamber closed by a valve plate (cylinder head (7)); a piston (piston (5)) reciprocating inside the cylinder in consecutive suction and compression strokes; and an actuating means operatively coupling the piston to the linear motor (the actuating means includes the cylinder (4) supporting the rotor (3b) and the spring assembly (8)), said piston and actuating means forming part of a resonant assembly (the resonant assembly includes the chambers (28a and 28b) inside the cylinder (4) holding the stator as well as the piston), comprising:

- a detecting means (pressure sensor (77)) to detect a load imposed to the linear motor of the compressor, in an operational condition of the latter related to the gas pressure in the discharge thereof (see column 6 lines 31-34); and

- a frequency adjusting means (including pressure control valves (25a, 25b, 25c, 25d) and pressure chambers (28a, 28b)) operatively associated with the detecting means and with the resonant assembly, in order to define, as a function of the operational condition detected for the gas in the discharge of the compressor, a frequency adjustment by varying at least one of the values related to the mass of the resonant assembly and to the average stroke of the piston (The pressure chambers (28a, 28b) are filled with compressed fluid based on the output of the pressure sensor and the stroke of the piston. This shifts the position of the stator base (27) in relationship to the compressor housing and the piston, and effectively changes mass of the resonant assembly which includes the chambers, the piston, and the coil spring (29)

while varying the center of oscillation of the piston.), to a value of the mechanical resonance frequency of the resonant assembly corresponding to the electrical supply frequency (mass is added to the pressure chambers based on the stroke of the piston, which is controlled by the electrical supply frequency, which would control the resonant frequency of the piston assembly and the coil spring (29)), maintaining unaltered the minimum distance between the piston and the valve plate at the end of each compression stroke (see column 6 lines 5-65).

In Reference to Claim 2

Morita et al. teach a system, as set forth in claim 1 (see the rejection of claim 1 above), wherein the detecting means detects at least one of the conditions of: pressure and temperature of the gas compressed in the discharge of the compressor (pressure sensor (77) measures the pressure in the compressors discharge, and temperature sensor (70) measures an ambient temperature), and operational electrical current of the linear motor.

In Reference to Claim 3

Morita et al. teach a system, as set forth in claim 2 (see the rejection of claim 2 above), wherein it comprises a control unit (controller (100)) operatively connected to both the detecting means and the adjusting means (controller receives input from the sensors, and controls the pressure chambers accordingly), in order to receive, from the former, information about one of the operational conditions of: pressure and temperature of the gas in the discharge of the compressor, and operational electrical current of the linear motor (see column 6 lines), and to instruct the adjusting means to

provide one of the operations of varying the average stroke of the piston and varying the mass of the resonant assembly (The controller varies the mass of the piston actuator assembly (the cylinder (4) holding the stator) by adding and removing fluid to the chambers (28) formed in it.).

In Reference to Claim 4

Morita et al. teach a system, as set forth in claim 3 (see the rejection of claim 3 above), wherein the variation of the mass of the resonant assembly is achieved by modifying the mass of at least one of the parts defined by the actuating means and the piston (The controller varies the mass of the piston actuator assembly (the cylinder (4) holding the stator) by adding and removing fluid to the chambers (28) formed in it.).

In Reference to Claim 5

Morita et al. teach a system, as set forth in claim 4 (see the rejection of claim 4 above), wherein each part of the resonant assembly, to have its mass modified, comprises an internal chamber containing an equalizing fluid (the chambers (28a, 28b)) and being maintained in fluid communication with an equalizing fluid reservoir defined in the interior of the compressor shell (the fluid comes from the discharge port (7b) of the compressor, which is located in the compressor shell), the variation of the mass of the resonant assembly being achieved by modifying the mass of the fluid inside the internal chamber (see column 6 lines 41-56).

In Reference to Claim 6

Morita et al. teach a system, as set forth in claim 5 (see the rejection of claim 5 above), wherein the internal chamber of the piston presents a constant volume (the

volume of the chamber of the compressor (inside casing (1)) where the piston is located is constant), and being maintained in fluid communication with an equalizing fluid impelling means (the piston (5) is used to impel the equalizing fluid, since the equalizing fluid is the refrigerant) provided in the interior of the shell in fluid communication with the equalizing fluid reservoir, in order to selectively pump said equalizing fluid into and out from said internal chamber (the fluid is pumped into and out of the compressor casing, and is also controlled by the controller to enter the chambers (28)).

In Reference to Claim 7

Morita et al. teach a system, as set forth in claim 6 (see the rejection of claim 6 above), wherein the equalizing fluid is defined by the lubricant oil of the compressor (the equalizing fluid is the refrigerant of the compressor, which is defined by the lubricant oil (11) in the sense that the lubricating oil is used to lubricate the piston which compresses the refrigerant) provided in an oil reservoir defined at the bottom of the compressor shell (see figure 4).

In Reference to Claim 8

Morita et al. teach a system, as set forth in claim 2 (see the rejection of claim 2 above), wherein the variation of the operational stroke of the piston is obtained by modifying the dead point of the piston at the end of the suction stroke (The variation of the piston stroke is controlled by the controller based on when the piston is at its top dead center position, which, depending on how it is defined, could occur at either the beginning or the end of the suction stroke).

In Reference to Claim 9

Morita et al. teach a system, as set forth in claim 8 (see the rejection of claim 8 above), wherein the modification of the dead point of the piston at the end of the suction stroke is achieved by an adjusting means in the form of an impeller (the center of oscillation of the piston of the piston is controlled by the amount of gas in the resonant chambers (28)), which is operatively coupled to the resonant assembly and to the control unit, so as to be driven by the latter between an inoperative condition, in which it does not produce any alteration in the stroke of the piston (a central position, where the amount of fluid in each chamber is equal), and an operative condition, in which it modifies the stroke of the piston (a position to the right or left of the central position) for adjusting the mechanical resonance frequency of the resonant assembly to the electrical supply resonance frequency (the center of oscillation of the piston is controlled based on the stroke of the piston, which is controlled by an output voltage, see column 4 lines 34-62).

In Reference to Claim 10

Morita et al. teach a system, as set forth in claim 9 (see the rejection of claim 9 above), wherein the impeller is one of the devices defined by an hydraulic actuator, a pneumatic actuator (the piston control device can be considered as either a hydraulic or pneumatic device, since it relies on compressed refrigerant to control the center of oscillation of the piston), and a mechanical actuator.

In Reference to Claim 11

Morita et al. teach a system, as set forth in claim 10 (see the rejection of claim 10 above), wherein the hydraulic actuator is maintained in fluid communication with an

equalizing fluid reservoir provided in the interior of the shell (the fluid comes from the discharge port (7b) of the compressor, which is located in the compressor shell), said hydraulic actuator being defined in a non-resonant portion of the compressor (the actuator valves (25) are located on a portion of the compressor outside of the casing, remote from the resonant portion).

In Reference to Claim 12

Morita et al. teach a system, as set forth in claim 11 (see the rejection of claim 11 above) and in which the resonant assembly comprises a spring means (coil spring (29)) coupling the resonant assembly to the non-resonant assembly of the compressor (the coil spring couples the chambers (28) and the stator (3a) to the cylinder (4)), wherein the hydraulic actuator is operatively coupled to the spring means (the hydraulic actuator inside the chambers (28) is connected to the spring via the stator (3a)).

In Reference to Claim 13

Morita et al. teach a system, as set forth in claim 12 (see the rejection of claim 12 above) and in which in the bottom of the shell is defined a lubricant oil reservoir (see figure 4), characterized in that wherein the equalizing fluid is defined by the lubricant oil of the compressor (the equalizing fluid is the refrigerant of the compressor, which is defined by the lubricant oil (11) in the sense that the lubricating oil is used to lubricate the piston which compresses the refrigerant).

In Reference to Claim 14

Morita et al. teach a system, as set forth in claim 10 (see the rejection of claim 10 above), characterized in that wherein the pneumatic actuator is maintained in fluid

communication with a reservoir (the reservoir is the outlet of the piston (7b)), for an equalizing fluid in the form of gas, provided in the interior of the shell (the outlet of the piston is located inside the casing (1)), said pneumatic actuator being defined in a non-resonant portion of the compressor (the actuator valves (25) are located on a portion of the compressor outside of the casing, remote from the resonant portion).

In Reference to Claim 15

Morita et al. teach a system, as set forth in claim 14 (see the rejection of claim 14 above), in which the resonant assembly comprises a spring means (coil spring (29)) coupling the resonant assembly to the non-resonant assembly of the compressor (the coil spring couples the chambers (28) and the stator (3a) to the cylinder (4)), wherein the pneumatic actuator is operatively coupled to the spring means (the hydraulic actuator inside the chambers (28) is connected to the spring via the stator (3a)).

In Reference to Claim 16

Morita et al. teach a system, as set forth in claim 15 (see the rejection of claim 15 above), wherein the pneumatic actuator has a cylinder incorporated to the non-resonant assembly (the cylinder (4) which holds the pneumatically operated chambers (28) is part of the non-resonant assembly of the compressor) and a plunger axially displaceable in the interior of the cylinder (the stator (3a) reciprocates in the chambers (28) of the cylinder) and which operates as a movable stop means onto which is seated the spring means of the resonant assembly (the base of the spring (29) rests on the stator (3a)).

In Reference to Claim 17

Morita et al. teach a system, as set forth in claim 16 (see the rejection of claim 16 above), wherein the pneumatic actuator is a bellows (The pneumatic chambers (28) are bellows in the sense that it is a device with a chamber that can be expanded to draw in air through a valve and contracted to expel it through a tube.).

In Reference to Claim 28

Morita et al. teach a system, as set forth in claim 10 (see the rejection of claim 10 above), characterized in that wherein the equalizing fluid is the refrigerant gas compressed by the compressor (the equalizing fluid is lead from the outlet of the compressor (7b) to the chambers (28a and 28b)).

In Reference to Claim 29

Morita et al. teach a system, as set forth in claim 28 (see the rejection of claim 28 above), wherein it comprises a control valve maintained in fluid communication with the cylinder of the pneumatic actuator through at least one opening of said cylinder (the control valves (25) communicate with the chambers (28) inside the cylinder (4) through pipes (26a and 26b) formed in the cylinder), a control valve lodging a sealing means which is selectively displaced between a closed position, a pressurization position and a depressurization position (each control valve would necessarily have an open and closed position, and they would be controlled by the controller to either allow the chamber to be pressurized or depressurized), in order to, selectively, block the opening of the cylinder upon discharge of the compressor (when the valves are closed, the chambers would be blocked from the discharge of the compressor) and communicate the interior of the cylinder with the interior of the compressor shell (when the valves are

open, the chambers would be open to receive pressurized fluid from the outlet port of the compressor, which is located inside the compressor's casing).

10. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 6,676,388 to Lee et al. (Lee et al.).

Lee et al. teach a system for adjusting resonant frequencies in a linear compressor comprising, in the interior of a shell (container (10)) a linear motor (reciprocating motor (20)) supplied by an AC electrical current presenting a predetermined electrical supply frequency (current is supplied to the motor at a given frequency); a cylinder (compressing cylinder (100)) within which is defined a compression chamber closed by a valve plate (valve unit (150)); a piston (cylindrical body portion (121)) reciprocating inside the cylinder in consecutive suction and compression strokes; and an actuating means operatively coupling the piston to the linear motor (including connection support (122)), said piston and actuating means forming part of a resonant assembly (along with resonance springs (130)), comprising:

- a detecting means (pressure control valve (170) is a detecting means in the sense that it detects the pressure at an outlet of the compressor) to detect a load imposed to the linear motor of the compressor, in an operational condition of the latter related to the gas pressure in the discharge thereof; and

- a frequency adjusting means (position controlling cylinder (110)) operatively associated with the detecting means (via connection pipe (160)) and with the resonant assembly (the controlling cylinder (110) is connected to the piston which is connected to

the support (122)), in order to define, as a function of the operational condition detected for the gas in the discharge of the compressor, a frequency adjustment by varying at least one of the values related to the mass of the resonant assembly and to the average stroke of the piston (the mass of a refrigerant fluid in the body (111) is increased as the pressure in the compressor's discharge is increased. This changes the stroke length of the piston, while also acting as a gas spring to change the resonance of the spring assembly), to a value of the mechanical resonance frequency of the resonant assembly corresponding to the electrical supply frequency, maintaining unaltered the minimum distance between the piston and the valve plate at the end of each compression stroke (see columns 6-7 lines 50-33).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. in view of U.S. Patent 4,854,833 to Kikuchi et al. (Kikuchi et al.).

Morita et al. teach a system, as set forth in claim 29 (see the rejection of claim 29 above), but does not teach the specific details of the valve assembly.

Kikuchi et al. teach a similarly controlled reciprocating compressor, where rear-side sealed spaced (18a) can be filled with air via a control valve (22). The control

valve's sealing means is a slide (valve body (22a) is capable of sliding) provided with an internal passage (recess (54)) and which is linearly displaceable in one and in the other direction (the valve can slide clockwise and counterclockwise when turned by a screwdriver, see column 6 lines 49-59), in order to provide the alignment and disalignment of said internal passage in relation to the opening. It would have been obvious to one of ordinary skill in the art at the time of invention to use the valve disclosed by Kikuchi et al. in the apparatus of Morita et al. since Morita et al. do not disclose any valve details, and since valves of the type taught by Kikuchi et al. are well known in the art.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 6,632,076 to Morita et al. and U.S. Patent 6,540,485 to Nara et al. teach similar reciprocating compressor devices.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA L. MYERS whose telephone number is (571)270-5059. The examiner can normally be reached on Monday through Friday, 8:30am to 5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on 571-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art Unit 3746

/JLM